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win teaches a dualism of subjective and outer controls; but in other respects they are not so far apart.

Play, sembling and experimentation are central in this theory of knowledge. In play we semble, that is, we treat an object which we have invented, one 'freely' determined by 'subjective control,' as though it possessed certain coefficients of reality which it lacks. By experimentation we test these play constructions and find that they are either mere fancies (belonging to the inner world of subjective control) or else sense objects (possessing universality and belonging to the outer world of foreign control). Thus play and experimentation, leading to judgment, mediate between the 'inner' and the 'outer,' between 'subjective control' and 'outer control.' The author does not refer to language, or to sympathy, imitation, jealousy, bashfulness, gregariousness and other instinctive or impulsive reactions which involve social situations. Why should play be singled out as the only impulsive reaction contributing to the development of judgment? Universality is not involved in mere play because (1) few can enter into a game and (2) both the objects and the self of play are tentative and fictitious. Mere semblance is not characteristic of objects of knowledge as such. In short, we find a gap between play and experimentation, between sembling and judging, which the book has not filled, the gap between perception and conception, between sense and reason, between mere sentience and reflection. The author's theory seems to lead to the doctrine that facts are all 'outer'—that they are ultimately trans-objective—while meanings and values are all subjective (see pp. 135 f.), and judgment must perform the miracle of joining them. Beyond this difficulty, the author's dualism of subjective and outer controls would make genuine experimentation and judging impossible. These brief critical suggestions, of course, need elaboration, but the reviewer's respect for the writer's results as well as his sense of the importance of this discussion incline him to let them stand.

G. A. TAWNEY

THE WAYS OF SHEEP.

The Flock. By MARY AUSTIN. Pp. 266, illustrated. Houghton, Mifflin and Company. 1906.

Scientific observation as conducted by scientific men is rigorous, repeated and checked by the ingenious employment of experimental control of conditions. Observation by the nature lover may not be so guarded and tested. And every publication by word of mouth or impress of type of obviously mistaken record of seeing or of misinterpretation of the really seen that comes from the nature lover confirms the rigorous-minded scientific man in the belief that only his sort of observation reveals the truth. Hence we do not search literary books for contributions to science: which is a habit of omission that may lose to us some valuable data.

Mary Austin, an author known especially to readers of the *Atlantic Monthly* and to those generally who seek to acquaint themselves with the better sort of American writing, has included in 'The Flock' a host of singularly interesting and suggestive observations on the ways of sheep. The author has lived near (in more ways than one) sheep and sheep dogs and sheep men for seventeen years, and is a keen and careful observer and an honest and gifted recorder of her observations. Hence 'The Flock' is a book which the driven scientific man may read for recreation and information at once. How unusual!

I shall take space to refer to but two or three of Mrs. Austin's observations or summations of observation. The 'mob mind' of sheep is a very real thing in determining the ways of the flock. In the flock there are always leaders, middlers and tailers, each insisting on its own place in the order of going. Should the flock be rounded up suddenly in alarm it mills within itself until these have come to their own places.

Suppose the sheep to scatter widely on a heather-planted headland, the leader feeding far to windward. Comes a cougar sneaking up the trail between the rooted boulders toward the meanest of the flock. The smell of him, the play of light on his sleek flanks startles the unslumbering fear in the meanest; it runs widening in the

flock-mind, exploding instantly in the impulse of flight.

Danger! flashes the flock-mind, and in danger the indispensable thing is to run, not to wait until the leader sniffs the tainted wind and signals it; not for each and singly to put the occasion to the proof; but to run—of this the flock-mind apprizes—and to keep on running until the impulse dies faintly as water-rings on the surface of a mantling pond. In the wild pastures flight is the only succor, and since to cry out is to interfere with that business and draw on the calamity, a flock in extremity never cries out.

Consider, then, the inadequacy of the flock-mind. A hand-fed leader may learn to call the herder vociferously, a cosset lamb in trouble comes blatting to his heels, but the flock has no voice other than the deep-mouthed peelings hung about the leader's neck. In all that darkling lapse of time since herders began to sleep with their weapons, affording a protection that the flock-mind never learns to invite, they have found no better trick than to be still and run foolishly. For the flock-mind moves only in the direction of the original intention. When at shearings or markings they run the yearlings through a gate for counting, the rate of going accelerates until the sheep pass too rapidly for numbering. Then the shepherd thrusts his staff across the opening, forcing the next sheep to jump, and the next, and the next, until, *Jump!* says the flock-mind. Then he withdraws the staff, and the sheep go on jumping until the impulse dies as the dying peal of the bells.

Have sheep inherited acquired characters of habit or increased in this way their mental equipment? Not according to what has just been written. But consider this:

I do not know very well what to make of that trait of lost sheep to seek rock shelter at the base of cliffs, for it suits with no characteristic of his wild brethren. But if an estray in his persistent journey up toward the high places arrives at the foot of a tall precipice, there he stays, seeking not to go around it, feeding out perhaps and returning to it, but if frightened by prowlers, huddling there to starve. Could it be the survival, not of a wild instinct—it is too foolish to have been that—but of the cave-dwelling time when man protected him in his stone shelters or in pens built against the base of a cliff, as we see the herder yet for greater convenience build rude corrals of piled boulders at the foot of an overhanging or insurmountable

rocky wall? It is yet to be shown how long man halted in the period of stone dwelling and the sheep with him; but if it be assented that we have brought some traces of that life forward with us, might not also the sheep?

But, from the other side, consider this:

Where the wild strain most persists is in the bedding habits of the flock. Still they take for choice, the brow of a rising hill, turning outward toward the largest view; and never have I seen the flock all lie down at one time. Always as if by prearrangement some will stand, and upon their surrendering the watch others will rise in their places headed to sniff the tainted wind and scan the rim of the world. Like a thing palpable one sees the racial obligation pass through the bedded flock; as the tired watcher folds his knees under him and lies down, it passes like a sigh. By some mysterious selection, it leaves a hundred ruminating in quietude and troubles the appointed one. One sees in the shaking of his sides a hint of struggle against the hereditary and so unnecessary instinct, but sighing he gets upon his feet. By noon or night the flock instinct never sleeps. Waking and falling asleep, waking and spying on the flock, no chance discovers the watchers failing, even though they doze upon their feet; and by nothing so much is the want of interrelation of the herder and the flock betrayed, for watching is the trained accomplishment of dogs.

Our 'amelioration' of the sheep has certainly lost them much—even though we have gained. This is, of course, the familiar story of artificial selection. It is chiefly artificial degradation. Mrs. Austin records this:

Of the native instincts for finding water and knowing when food is good for them herded goats have retained much, but sheep not a whit. In the open San Joaquin, said a good shepherd of that country, when the wind blew off the broad lake, his sheep, being thirsty, would break and run as much as a mile or two in that direction; but it seems that the alkaline dust of the desert range must have diminished the keenness of smell, for Sanger told me how, on his long drive, when his sheep had come forty miles without drink and were then so near a water-hole that the horses scented it and pricked up their ears, the flock became unmanageable from thirst and broke back to the place where they had last drunk.

And this:

Sheep will die rather than drink water which does not please them, and die drinking water with

which they should not be pleased. Nor can they discriminate in the matter of poisonous herbs. In the northerly Sierras they perish yearly, cropping the azaleas; Julien lost three or four hundred when wild tobacco (*Nicotiana attenuata*) sprang up after a season of flood water below Coyote Holes; and in places about the high mountains there are certain isolated meadows wherein some herb unidentified by sheepmen works disaster to the ignorant or too confiding herder. Such places come to be known as poison meadows, and grasses ripen in them uncropped year after year.

What have the sheep come to know of man in their fifty centuries' association with him? Mrs. Austin answers:

It is doubtful if the herder is anything more to the flock than an incident of the range, except as a giver of salt, for the only cry they make to him is the salt cry. When the natural craving is at the point of urgency they circle about his camp or his cabin, leaving off feeding for that business; and nothing else offering, they will continue this headlong circling about a boulder or any object bulking large in their immediate neighborhood remotely resembling the appurtenances of man, as if they had learned nothing since they were free to find licks for themselves, except that salt comes by bestowal and in conjunction with the vaguely indeterminate lumps of matter that associate with man. As if in fifty centuries of man-herding they had made but one step out of the terrible isolation of brute species, an isolation impenetrable except by fear to every other brute, but now admitting the fact without knowledge, of the God of the Salt. Accustomed to receiving this miracle on open boulders, when the craving is strong upon them they seek such as these to run about, vociferating, as if they said, In such a place our God has been wont to bless us; come now let us greatly entreat Him. This one quavering bleat, unmistakable to the sheepman even at a distance, is the only new note in the sheep's vocabulary, and the only one which passes with intention from himself to man. As for the call of distress which a leader raised by hand may make to his master, it is not new, is not common to flock usage, and is swamped utterly in the obsession of the flock-mind.

Then there are the sheep dogs, those wolves that we have ameliorated to protect the sheep from other wolves. But our space prevents even a tasting of the interesting notes on dog ways that the book offers. Let us but just note the strong insistence of our author ob-

server that dogs are not bred sheep dogs, but trained to be sheep dogs. "What good breeding means in a young collie is not that he is fit to herd sheep, but that he is fit to be trained to it." Rather against the inheritance of acquirements, this.

There is much keen observation, much shrewd suggestion, and no end of delight in 'The Flock.' And trained in the scientific method or not, Mrs. Austin is honest and truthful as one may be. That is, she tells only what to her eye and ear and mind comes with the seeming of truth. No rigorous scientific pundit can do more. For truth is for any of us too often at the bottom of the well.

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SOCIETIES AND ACADEMIES

THE GEOLOGICAL SOCIETY OF WASHINGTON

THE 185th meeting of the society was held on January 9, 1907, with President Lindgren in the chair and fifty-four persons present.

Regular Program

The Paleozoic Section of the Upper Yukon, Alaska: ALFRED H. BROOKS and E. M. KINDLE.

This paper was presented by Mr. Brooks, who, in company with Mr. Kindle, devoted part of the field season of 1906 to a detailed study of the rocks exposed between the international boundary and Fort Yukon, along the banks of the Yukon and Porcupine Rivers.

The total thickness of Paleozoic strata, comprising this section, is estimated to exceed 15,000 feet, but as the bottom was not determined, it may be very much greater. *The lowest member* of the succession is a series of quartzites with intercalated limestones and shales, which is well developed on the Porcupine near the international boundary. Provisionally, at least, these rocks may be correlated with the more highly altered rocks called the Birch Creek schists which occur in large areas south of the Yukon. On the Porcupine these rocks are comparatively little altered and intrusives appear to be entirely absent, except for occasional small dikes, while